

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS

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- 1 A method for treating a patient suffering from one or more insulin related ailments, which method comprises the step of: administering to a patient an therapeutically effective amount of a compound that is a biological modulator of insulin activity, which compound possesses ionic and hydrophobic chemical moieties spatially located so as to mimic at least an ionic and hydrophobic amino acid residue of insulin, which amino acids are associated with the binding of insulin to its receptor.
 - 2 A method according to claim 1, wherein the ionic amino acid residue is selected from the group comprising: A21 Asn, B21 Glu and A17 Glu.
 - 3 A method according to claim 1, wherein the ionic and hydrophobic amino acid residue(s) is(are) selected from the group consisting of: A21 Asn, B21 Glu, A17 Glu, B24 Phe, B25 Phe, A19 Tyr, B12 Val, B16 Tyr, A2 Ile, A3 Val and A1 Gly.
 - 4 A method according to claim 1, wherein at least one amino acid is selected from the group comprising: A17 Glu, B21 Glu and A21 Asn; and at least one amino acid is selected from the group comprising: B24 Phe, B25 Phe, A19 Tyr, B12 Val and B12 Tyr.
 - 5 A method according to claim 1, wherein the non-peptidyl compound possesses ionic and hydrophobic chemical moieties spatially located so as mimic ionic and hydrophobic residues associated with at least one of the following groups of amino acid residues:
 - (i.) A21 Asn, B21 Glu, A17 Glu, B24 Phe, B25 Phe;
 - (ii.) A21 Asn, B21 Glu, B24 Phe, B25 Phe;
 - (iii.) A21 Asn, B21 Glu, B24 Phe, B25 Phe, A1 Gly, A2 Ile, A3 Val;
 - (iv.) A21 Asn, B21 Glu, A17 Glu, A19 Tyr, A1 Gly, A2 Ile, A3 Val;
 - (v.) A21 Asn, B21 Glu, A17 Glu, B12 Val, A1 Gly, A2 Ile, A3 Val;
 - (vi.) A21 Asn, B21 Glu, B12 Val, A1 Gly, A2 Ile, A3 Val;
 - (vii.) A21 Asn, B21 Glu, A17 Glu, B16 Tyr, A1 Gly, A2 Ile, A3 Val;

- (viii.) A21 Asn, B21 Glu, A17 Glu, A19 Tyr, B12 Val, B16 Tyr;

(ix.) A21 Asn, B21 Glu, A19 Tyr, B12 Val, B16 Tyr;

(x.) A21 Asn, B21 Glu, A17 Glu, B24 Phe, B25 Phe, A19 Tyr, B12 Val, B16 Tyr;

5 (xi.) A21 Asn, B21 Glu, B24 Phe, B25 Phe, A19 Tyr, B12 Val, B16 Tyr;

(xii.) A21 Asn, B21 Glu, B24 Phe, B25 Phe, B12 Val, B16 Tyr;

(xiii.) A21 Asn, B21 Glu, A17 Glu, B24 Phe, B25 Phe, A19 Tyr;

(xiv.) A21 Asn, B21 Glu, B24 Phe, B25 Phe, A19 Tyr;

(xv.) A21 Asn, A17 Glu, B24 Phe, B25 Phe, A19 Tyr;

10 (xvi.) B21 Glu, A17 Glu, B24 Phe, B25 Phe, A19 Tyr;

(xvii.) A21 Asn, B21 Glu, A17 Glu, B24 Phe, B25 Phe, B12 Val;

(xviii.) A21 Asn, B21 Glu, B24 Phe, B25 Phe, B12 Val;

(xix.) A21 Asn, A17 Glu, B24 Phe, B25 Phe, B12 Val;

(xx.) B21 Glu, A17 Glu, B24 Phe, B25 Phe, B12 Val;

15 (xxi.) A21 Asn, B21 Glu, A17 Glu, B24 Phe, B25 Phe, B16 Tyr;

(xxii.) A21 Asn, B21 Glu, B24 Phe, B25 Phe, B16 Tyr;

(xxiii.) A21 Asn, A17 Glu, B24 Phe, B25 Phe, B16 Tyr;

(xxiv.) B21 Glu, A17 Glu, B24 Phe, B25 Phe, B16 Tyr;

(xxv.) A21 Asn, B21 Glu, A17 Glu, B24 Phe, A19 Tyr, B12 Val, B16 Tyr;

20 (xxvi.) A21 Asn, B21 Glu, B24 Phe, A19 Tyr, B12 Val, B16 Tyr;

(xxvii.) A21 Asn, A17 Glu, B24 Phe, A19 Tyr, B12 Val, B16 Tyr;

(xxviii.) B21 Glu, A17 Glu, B24 Phe, A19 Tyr, B12 Val, B16 Tyr;

(xxix.) A21 Asn, B21 Glu, A17 Glu, B25 Phe, A19 Tyr, B12 Val, B16 Tyr;

(xxx.) A21 Asn, B21 Glu, B25 Phe, A19 Tyr, B12 Val, B16 Tyr;

25 (xxxi.) A21 Asn, A17 Glu, B25 Phe, A19 Tyr, B12 Val, B16 Tyr; or

(xxxii.) B21 Glu, A17 Glu, B25 Phe, A19 Tyr, B12 Val.

- 6 A method according to claim 1, wherein the non-peptidyl compound has the following formula:



where A is W or VXW;

5 V is V_1 or V_2 ;

V is substituted with up to two X groups;

V_1 is a phenyl or 6 membered heteroaromatic ring, optionally substituted with up to 5 R_1 groups, for example but not being limited to benzene, pyridine, pyridazine, pyrimidine, pyrazine, triazine;

10 V_2 is a 5 member ring system which may incorporate up to 4 hetero atoms which may be independently a nitrogen atom, a nitrogen atom optionally substituted with R_2 , oxygen or sulfur, for example but not being limited to cyclopenta-1,3-diene, pyrrole, furan, thiophene, oxazole, isoxazole, pyrazole, imidazole, thiazole, isothiazole or triazole, the ring system being optionally substituted with up to 4 R_1 groups;

15 W is W_1 or W_2 or W_3 ;

W is substituted with up to two X groups;

W_1 is V_1 ;

20 W_2 is a fused bicyclic ring system comprising rings of 5 or 6 atoms, which may incorporate up to 4 hetero atoms, which may be independently a nitrogen atom, a nitrogen atom optionally substituted with R_2 , oxygen or sulfur, the system being optionally substituted with up to seven R_1 groups and examples include, but are not limited to naphthalene, quinoline, isoquinoline, phthalazine, naphthyridine, quinoxaline, quinazoline, 25 cinnoline, pteridine, indole, benzothiophene, benzofuran, benzimidazole, indazole, benzoxazole, benzisooxazole, benzthiazole, benzisothiazole, purine, indoline, isoindoline;

W_3 is $-N(R_2)R'_2$;

30 R_1 is independently H, OH, alkyl, alkenyl, alkynyl, alkoxy, alkanol, hydroxyalkoxy, haloalkyl, haloalkoxy, halogen, SH, thioalkyl, cyano ($-CN$), $N(R_2)R'_2$, phenyl, phenyl optionally substituted with up to five alkyl groups

of 1 to 3 carbon atoms or up to five halogen atoms, benzyl, phenethyl, nitro, $-\text{COR}_3$, $-\text{R}_5\text{COR}_3$, $-\text{R}_5\text{SOR}_3$, $-\text{R}_5\text{SO}_2\text{R}_3$, $-\text{SO}_2\text{N}(\text{R}_2)\text{R}'_2$ or azido;

R_2 and R'_2 are independently H, alkyl of 1 to 6 carbon atoms, alkenyl of 3 to 6 carbon atoms, alkynyl of 3 to 6 carbons, hydroxyalkyl of 2 to 6 carbons, alkoxy of 2 to 6 carbons, haloalkyl, haloalkenyl, haloalkoxy, benzyl, benzyl optionally substituted with up to four R_1 groups, phenylethyl, phenylethyl optionally substituted with up to four R_1 groups, arylalkyl, and where R_2 and R'_2 can also be joined to form cyclic structures including, but not limited to pyrrolidine, piperidine, hexahydro-1H-azepine, morpholine or piperazine;

R_3 is independently H, OH, alkyl, alkenyl, alkynyl, alkoxy, alkanol, hydroxyalkoxy, $-\text{R}_4\text{N}(\text{R}_2)\text{R}'_2$, mesyl, trifluoromesyl, $-\text{NHSO}_2\text{CH}_3$ or $-\text{NHSO}_2\text{CF}_3$;

R_4 is independently a bond, alkyl, alkenyl or alkynyl;

X is independently, a bond, $-\text{R}_4\text{N}(\text{R}_2)\text{R}_4^-$, $-\text{R}_4\text{N}=\text{NR}_4^-$, $-\text{R}_4\text{N}(\text{R}_2)-\text{N}(\text{R}_2)\text{R}_4^-$, $-\text{R}_4\text{OR}_4^-$, $-\text{R}_4\text{SR}_4^-$, $-\text{R}_5^-$, $-\text{R}_5\text{O}^-$, $-\text{R}_5\text{S}^-$, $-\text{R}_5\text{N}(\text{R}_2)^-$, $-\text{SO}^-$, sulfonyl ($-\text{SO}_2^-$), $-\text{CO}^-$, $-\text{CONH}^-$, $-\text{NHCONH}^-$, $-\text{NHCO}^-$, $-\text{CONHCO}^-$, $-\text{CON}(\text{R}_2)^-$, $-\text{R}_5\text{COR}_5^-$, $-\text{R}_5\text{COR}_5\text{N}(\text{R}_2)\text{R}_5^-$, $-\text{N}(\text{R}_2)\text{CO}^-$ or $-\text{R}_4\text{N}(\text{R}_2)\text{R}_4\text{COR}_4^-$;

R_5 is independently alkyl, alkenyl, alkynyl, alkoxy, alkanol, hydroxyalkoxy;

Y is either Y_1 , Y_2 or Y_3 ;

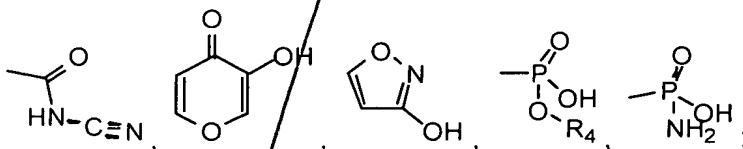
Y is substituted with at least two, but optionally up to four X linking groups;

Y_1 is a fused bicyclic ring system comprising rings of 5 or 6 atoms which may incorporate up to 4 hetero atoms, which may be independently a nitrogen atom, a nitrogen atom optionally substituted with R_2 , oxygen or sulfur, the ring system optionally independently incorporating a sulfoxide (SO), sulfone (SO_2) or carbonyl (CO) group and optionally up to seven R_1 groups, for example but not limited to croman, isochroman, benzofuran, cromene, 1,2,3,4-tetrahydronaphthalene, 1,4-dihydronaphthalene, indan, indene, benzopiperidine, indoline, isoindoline, quinoline, isoquinoline, phthalazine, naphthyridine, quinoxaline, quinazoline, cinnoline or pteridine, coumarin or 2,3-dihydrocoumarin;

Y₂ is a 6:6:6 or a 6:5:6 fused tricyclic system which may incorporate up to 4 hetero atoms which may be independently a nitrogen atom, a nitrogen atom optionally substituted with R₂, oxygen or sulfur, the ring system optionally independently incorporating a sulfoxide (SO), sulfone (SO₂) or carbonyl (CO) group, and the ring system being substituted with at least two, but optionally up to four X linking groups and optionally up to seven R₁ groups and thus examples include, but are not limited to 9H-xanthone, 9H-xanthene, phenoxathiin, phenoxathiin-10-oxide, phenoxathiin-10-dioxide, acridine, phenazine, phenothiazine, phenoxazine, phenothiazine-5-oxide, phenothiazine-5-dioxide, thiathrene-5-dioxide, thiathrene-5-oxide, carbazole, dibenzo[b,d]furan, dibenzo[b,d]thiophene;

Y₃ is V₁;

Z is independently -R₆COOH, -R₆SO₃H, -R₆NO₂, -R₆SO₂H, -R₆SO₂NHR₂; -R₇SO₂NHCOR₄, -N-trifluoromesylsulfonamidate, -OH, -2-yl-hydroxyethanoic acid (-CH(OH)COOH), -3-yl-2-hydroxypropanoic acid (-CH₂CH(OH)COOH), -2-yl-2-hydroxypropanoic acid (-CH(CH₃)(OH)COOH), -3-yl-2,3-dihydroxypropanoic acid (-CH(OH)CH(OH)COOH), -2-yl-2,3-dihydroxypropanoic acid (-C(CH₂(OH))(OH)COOH), -3-yl-2-hydroxypropan-3-one-1-oic acid (-COCH(OH)COOH), 2-yl-2-hydroxypropandioic acid (-C(COOH)(OH)COOH), -2-yl-propandioic acid (-C(COOH)(H)COOH), -4-yl-2-hydroxybutan-4-one-1-oic acid (-COCH₂CH(OH)COOH), 2-yl-2-hydroxybutan-1,4-dioic acid (-C(OH)(COOH)CH₂COOH), 3-yl-2-hydroxybutan-1,4-dioic acid (-CH(CH(OH)COOH)COOH), 5-yl-tetrazole,



R₆ is independently a bond, alkyl, alkenyl, alkynyl, alkoxy, -CO(CH₂)_n-, where n is an integer between 0 and 4, alkanoic, alkenoic or alkynoic; with the exception that where W₁ is an optionally substituted phenyl then Y₁ cannot be an optionally substituted phenyl.

7 A method according to claim 6, wherein the non-peptidyl compound is a dimer or heterodimer wherein the compounds are joined through a X linking group by way of their V or W groups.

8 A method according to claim 6, wherein when V is V_1 or V_2 , then:

5 V_1 is selected from the group consisting of, benzene, pyridine, pyridazine, pyrimidine, pyrazine or triazine and is optionally substituted with up to 5 R_1 groups; and

V_2 is selected from the group consisting of, cyclopenta-1,3-diene, pyrrole, furan, thiophene, oxazole, isoxazole, pyrazole, imidazole, thiazole, isothiazole or triazole and is optionally substituted with up to 4 R_1 groups;

10 and W is W_2 then

W_2 is selected from the group consisting of naphthalene, quinoline, isoquinoline, phthalazine, naphthyridine, quinoxaline, quinazoline, cinnoline, pteridine, indole, benzothiophene, benzofuran, benzimidazole, indazole, benzoxazole, benzisooxazole, benzthiazole, benzisothiazole, purine, indoline or isoindoline and is optionally substituted with up to seven R_1 groups;

15 and Y is either Y_1 or Y_2 then

Y_1 is selected from the group consisting of croman, isochroman, benzofuran, cromene, 1,2,3,4-tetrahydronaphthalene, 1,4-dihydronaphthalene, indan, indene, benzopiperidine, indoline, isoindoline, quinoline, isoquinoline, phthalazine, naphthyridine, quinoxaline, quinazoline, cinnoline or pteridine, coumarin or 2,3-dihydrocoumarin and is optionally substituted with up to seven R_1 groups; and

25 Y_2 is selected from the group consisting of 9H-xanthone, 9H-xanthene, phenoxathiin, phenoxathiin-10-oxide, phenoxathiin-10-dioxide, acridine, phenazine, phenothiazine, phenoxazine, phenothiazine-5-oxide, phenothiazine-5-dioxide, thiathrene-5-dioxide, thiathrene-5-oxide, carbazole, dibenzo[b,d]furan or dibenzo[b,d]thiophene and is optionally substituted with up to seven R_1 groups.

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9 A method according to claim 6, wherein when A is VXW then:

V is phenyl or pyrazole, optionally substituted with up to 5 R_1 groups;

and when A is W or VXW then W is W_1 , W_2 or W_3 wherein

W_1 is phenyl optionally substituted with up to 5 R_1 groups;

5 W_2 is naphthalene or quinoline optionally substituted with up to seven R_1 groups wherein R_1 is independently H, OH, methyl, ethyl, propyl, nitro, methoxy, ethoxy, 2-hydroxyethoxy, chloro, fluoro or acetyl;

W_3 is $-N(R_2)R_2$ wherein R_2 is propyl;

10 X is independently, a bond, methoxy ($-OCH_2-$), oxypropoxy ($-O(CH_2)_3O-$), hexenyloxy ($-O(CH_2)_4CH=CH-$), sulfonyloxy ($-SO_2O-$), methyl ($-CH_2-$), amidyl ($-CONH-$) or $-NHCONH-$;

and Y is either Y_1 or Y_2 then

15 Y_1 is croman, 4-H-chromen-4-one or naphthalene optionally substituted with up to seven R_1 groups wherein R_1 is independently H, OH, methyl, ethyl, propyl, nitro, methoxy, ethoxy, 2-hydroxyethoxy, chloro, fluoro or acetyl;

Y_2 is 9H-xanthone optionally substituted with up to seven R_1 groups wherein R_1 is independently H, OH, methyl, ethyl, propyl, nitro, methoxy, ethoxy, 2-hydroxyethoxy, chloro, fluoro or acetyl;

20 Y_3 is phenyl optionally substituted with up to 5 R_1 groups wherein R_1 is independently H, OH, methyl, ethyl, propyl, nitro, methoxy, ethoxy, 2-hydroxyethoxy, chloro, fluoro or acetyl; and

Z is independently $-R_6COOH$, $-R_6SO_3H$ or $-N$ -trifluoromesylsulfonamidate wherein R_6 is independently a bond or propyl.

25 10 A method according to claim 6, wherein the non-peptidyl compound is selected from the following group of compounds:

- (i) 4,4'-Methylenebis[3-hydroxy-2-naphthalenecarboxylic acid];
- (ii) 7-[3-(4-acetyl-2-ethyl-5-hydroxyphenoxy)propoxy]-3,4-dihydro-8-propyl-2H-1-benzopyran-2-carboxylic acid;

- 5 (iii) 2,4-dichloro-6-(*N*-(trifluoromethanesulfonyl))sulfamoylphenyl 3,5-dichloro-2-hydroxybenzenesulfonate;
- (iv) 7-[(4-acetyl-3-hydroxy-2-propylphenyl)methoxy]-4-oxo-8-propyl-4*H*-1-benzopyran-2-carboxylic acid;
- 5 (v) 7-[3-(4-acetyl-3-methoxy-2-propylphenoxy)propoxy]-3,4-dihydro-8-propyl-2*H*-1-benzopyran-2-carboxylic acid;
- (vi) 3,4-dihydro-8-propyl-7-[[3-[2-ethyl-5-hydroxy-4-(1*H*-pyrazol-3-yl)phenoxy]propyl]oxy]-2*H*-1-benzopyran-2-carboxylic acid;
- 10 (vii) 3,4-dihydro-8-propyl-7-[[3-[2-ethyl-5-hydroxy-4-ethoxyphenoxy]propyl]oxy]-2*H*-1-benzopyran-2-carboxylic acid;
- (viii) 3-[4-[7-carboxy-9-oxo-3-[3-[2-ethyl-4-(4-fluorophenyl)-5-hydroxyphenoxy]propoxy]-9*H*-xanthene]]propanoic acid;
- (ix) 8-propyl-7-(quinol-2'-ylmethoxy)-3,4-dihydro-2*H*-1-benzopyran-2-carboxylic acid;
- 15 (x) 7-(naphth-2'-ylmethoxy)-8-propyl-3,4-dihydro-2*H*-1-benzopyran-2-carboxylic acid;
- (xi) *N*-(trifluoromethanesulfonyl)-3,5-dinitro-4-(*N*',*N*'-dipropylamino)benzenesulfonamide;
- (xii) 8-propyl-7-[3-[4-(4-fluorophenyl)-2-ethyl-5-hydroxyphenoxy]propoxy]-3,4-dihydro-2*H*-1-benzopyran-2-carboxylic acid;
- 20 (xiii) 3,4-dihydro-7-[[6-(4-methoxyphenyl)hexenyl]oxy]-8-propyl-2*H*-1-benzopyran-2-carboxylic acid; or
- (xiv) 8,8'-[Carbonylbis[imino-3,1-phenylenecarbonylimino(4-methyl-3,1-phenylene)carbonylimino]]bis-1,3,5-naphthalenetrisulfonic acid.
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11 A pharmaceutical composition comprising at least a chemical compound capable of modulating the biological activity of insulin and a pharmaceutically acceptable carrier and/or diluent; wherein said compound has the following general formula.



where A is W or VXW;

V is V_1 or V_2 ;

V is substituted with up to two X groups;

V_1 is a phenyl or 6 membered heteroaromatic ring, optionally substituted with up to 5 R_1 groups, for example but not being limited to benzene, pyridine, pyridazine, pyrimidine, pyrazine, triazine;

V_2 is a 5 member ring system which may incorporate up to 4 hetero atoms which may be independently a nitrogen atom, a nitrogen atom optionally substituted with R_2 , oxygen or sulfur, for example but not being limited to cyclopenta-1,3-diene, pyrrole, furan, thiophene, oxazole, isoxazole, pyrazole, imidazole, thiazole, isothiazole or triazole, the ring system being optionally substituted with up to 4 R_1 groups;

W is W_1 or W_2 or W_3 ;

W is substituted with up to two X groups;

W_1 is V_1 ;

W_2 is a fused bicyclic ring system comprising rings of 5 or 6 atoms, which may incorporate up to 4 hetero atoms, which may be independently a nitrogen atom, a nitrogen atom optionally substituted with R_2 , oxygen or sulfur, the system being optionally substituted with up to seven R_1 groups and examples include, but are not limited to naphthalene, quinoline, isoquinoline, phthalazine, naphthyridine, quinoxaline, quinazoline, cinnoline, pteridine, indole, benzothiophene, benzofuran, benzimidazole, indazole, benzoxazole, benzisooxazole, benzthiazole, benzisothiazole, purine, indoline, isoindoline;

W_3 is $-N(R_2)R'_2$;

R_1 is independently H, OH, alkyl, alkenyl, alkynyl, alkoxy, alkanol, hydroxyalkoxy, haloalkyl, haloalkoxy, halogen, SH, thioalkyl, cyano ($-CN$), $N(R_2)R'_2$, phenyl, phenyl optionally substituted with up to five alkyl groups of 1 to 3 carbon atoms or up to five halogen atoms, benzyl, phenethyl, nitro, $-COR_3$, $-R_5COR_3$, $-R_5SOR_3$, $-R_5SO_2R_3$, $-SO_2N(R_2)R'_2$ or azido;

R_2 and R'_2 are independently H, alkyl of 1 to 6 carbon atoms, alkenyl of 3 to 6 carbon atoms, alkynyl of 3 to 6 carbons, hydroxyalkyl of 2 to 6

carbons, alkoxy of 2 to 6 carbons, haloalkyl, haloalkenyl, haloalkoxy, benzyl, benzyl optionally substituted with up to four R_1 groups, phenylethyl, phenylethyl optionally substituted with up to four R_1 groups, arylalkyl, and where R_2 and R'_2 can also be joined to form cyclic structures including, but not limited to pyrrolidine, piperidine, hexahydro-1H-azepine, morpholine or piperazine;

R_3 is independently H, OH, alkyl, alkenyl, alkynyl, alkoxy, alkanol, hydroxyalkoxy, $-R_4N(R_2)R'_2$, mesyl, trifluoromesyl, $-NHSO_2CH_3$ or $-NHSO_2CF_3$;

R_4 is independently a bond, alkyl, alkenyl or alkynyl;

X is independently, a bond, $-R_4N(R_2)R_4-$, $-R_4N=NR_4-$, $-R_4N(R_2)-N(R_2)R_4-$, $-R_4OR_4-$, $-R_4SR_4-$, $-R_5-$, $-R_5O-$, $-R_5S-$, $-R_5N(R_2)-$, $-SO-$, sulfonyl ($-SO_2-$), $-CO-$, $-CONH-$, $-NHCONH-$, $-NHCO-$, $-CONHCO-$, $-CON(R_2)-$, $-R_5COR_5-$, $-R_5COR_5N(R_2)R_5-$, $-N(R_2)CO-$ or $-R_4N(R_2)R_4COR_4-$;

R_5 is independently alkyl, alkenyl, alkynyl, alkoxy, alkanol, hydroxyalkoxy;

Y is either Y_1 , Y_2 or Y_3 ;

Y is substituted with at least two, but optionally up to four X linking groups;

Y_1 is a fused bicyclic ring system comprising rings of 5 or 6 atoms which may incorporate up to 4 hetero atoms, which may be independently a nitrogen atom, a nitrogen atom optionally substituted with R_2 , oxygen or sulfur, the ring system optionally independently incorporating a sulfoxide (SO), sulfone (SO_2) or carbonyl (CO) group and optionally up to seven R_1 groups, for example but not limited to croman, isochroman, benzofuran, cromene, 1,2,3,4-tetrahydronaphthalene, 1,4-dihydronaphthalene, indan, indene, benzopiperidine, indoline, isoindoline, quinoline, isoquinoline, phthalazine, naphthyridine, quinoxaline, quinazoline, cinnoline or pteridine, coumarin or 2,3-dihydrocoumarin;

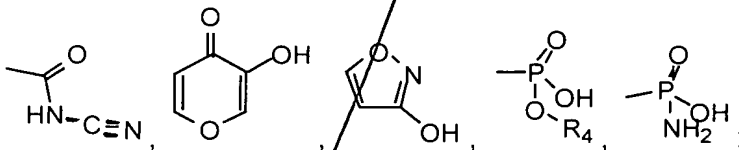
Y_2 is a 6:6:6 or a 6:5:6 fused tricyclic system which may incorporate up to 4 hetero atoms which may be independently a nitrogen atom, a nitrogen atom optionally substituted with R_2 , oxygen or sulfur, the ring system optionally independently incorporating a sulfoxide (SO), sulfone (SO_2) or carbonyl (CO) group, and the ring system being substituted with at least

two, but optionally up to four X linking groups and optionally up to seven R_1 groups and thus examples include, but are not limited to 9H-xanthone, 9H-xanthene, phenoxathiin, phenoxathiin-10-oxide, phenoxathiin-10-dioxide, acridine, phenazine, phenothiazine, phenoxazine, phenothiazine-5-oxide, phenothiazine-5-dioxide, thiathrene-5-dioxide, thiathrene-5-oxide, carbazole, dibenzo[b,d]furan, dibenzo[b,d]thiophene;

Y_3 is V_1 ;

Z is independently $-R_6COOH$, $-R_6SO_3H$, $-R_6NO_2$, $-R_6SO_2H$, $-R_6SO_2NHR_2$, $-R_7SO_2NHCOR_4$, -N-trifluoromesylsulfonamide, -OH, -2-yl-

hydroxyethanoic acid ($-CH(OH)COOH$), -3-yl-2-hydroxypropanoic acid ($-CH_2CH(OH)COOH$) -2-yl-2-hydroxypropanoic acid ($-CH(CH_3)(OH)COOH$), -3-yl-2,3-dihydroxypropanoic acid ($-CH(OH)CH(OH)COOH$), -2-yl-2,3-dihydroxypropanoic acid ($-C(CH_2(OH))(OH)COOH$), -3-yl-2-hydroxypropan-3-one-1-oic acid ($-COCH(OH)COOH$), 2-yl-2-hydroxypropandioic acid ($-C(COOH)(OH)COOH$), -2-yl-propandioic acid ($-C(COOH)(H)COOH$), -4-yl-2-hydroxybutan-4-one-1-oic acid ($-COCH_2CH(OH)COOH$), 2-yl-2-hydroxybutan-1,4-dioic acid ($-C(OH)(COOH)CH_2COOH$), 3-yl-2-hydroxybutan-1,4-dioic acid ($-CH(CH(OH)COOH)COOH$), 5-yl-tetrazole,



R_6 is independently a bond, alkyl, alkenyl, alkynyl, alkoxy, $-CO(CH_2)_n-$, where n is an integer between 0 and 4, alkanoic, alkenoic or alkynoic; with the exception that where W_1 is an optionally substituted phenyl then Y_1 cannot be an optionally substituted phenyl.

- 25 12 A pharmaceutical composition according to claim 11, wherein the non-peptidyl compound is a dimers or heterodimers of compounds where such compounds are joined through a X linking group by way of their V or W groups.

- 13 A pharmaceutical composition according to claim 11, wherein when V is V₁ or V₂, then:

V₁ is selected from the group consisting of, benzene, pyridine, pyridazine, pyrimidine, pyrazine or triazine and is optionally substituted with up to 5 R₁ groups; and

V₂ is selected from the group consisting of, cyclopenta-1,3-diene, pyrrole, furan, thiophene, oxazole, isoxazole, pyrazole, imidazole, thiazole, isothiazole or triazole and is optionally substituted with up to 4 R₁ groups;

and W is W₂ then

W₂ is selected from the group consisting of naphthalene, quinoline, isoquinoline, phthalazine, naphthyridine, quinoxaline, quinazoline, cinnoline, pteridine, indole, benzothiophene, benzofuran, benzimidazole, indazole, benzoxazole, benzisooxazole, benzthiazole, benzisothiazole, purine, indoline or isoindoline and is optionally substituted with up to seven R₁ groups;

and Y is either Y₁ or Y₂ then

Y₁ is selected from the group consisting of croman, isochroman, benzofuran, cromene, 1,2,3,4-tetrahydronaphthalene, 1,4-dihydronaphthalene, indan, indene, benzopiperidine, indoline, isoindoline, quinoline, isoquinoline, phthalazine, naphthyridine, quinoxaline, quinazoline, cinnoline or pteridine, coumarin or 2,3-dihydrocoumarin and is optionally substituted with up to seven R₁ groups; and

Y₂ is selected from the group consisting of 9H-xanthone, 9H-xanthene, phenoxathiin, phenoxathiin-10-oxide, phenoxathiin-10-dioxide, acridine, phenazine, phenothiazine, phenoxazine, phenothiazine-5-oxide, phenothiazine-5-dioxide, thiathrene-5-dioxide, thiathrene-5-oxide, carbazole, dibenzo[b,d]furan or dibenzo[b,d]thiophene and is optionally substituted with up to seven R₁ groups.

- 14 A pharmaceutical composition according to claim 11, wherein in the non-peptidyl compound of formula 1 when A is W or VXW then:

V is phenyl or pyrazole, optionally substituted with up to 5 R₁ groups;

and W is W₁, W₂ or W₃ then

W₁ is phenyl optionally substituted with up to 5 R₁ groups;

W₂ is naphthalene or quinoline optionally substituted with up to seven R₁ groups wherein R₁ is independently H, OH, methyl, ethyl, propyl, nitro, methoxy, ethoxy, 2-hydroxyethoxy, chloro, fluoro or acetyl;

W₃ is -N(R₂)R₂ wherein R₂ is propyl;

X is independently, a bond, methoxy (-OCH₂-), oxypropoxy (-O(CH₂)₃O-), hexenyloxy (-O(CH₂)₄CH=CH-), sulfonyloxy (-SO₂O-), methyl (-CH₂-), amidyl (-CONH-) or -NHCONH-;

and Y is either Y₁ or Y₂ then

Y₁ is croman, 4-H-chromen-4-one or naphthalene optionally substituted with up to seven R₁ groups wherein R₁ is independently H, OH, methyl, ethyl, propyl, nitro, methoxy, ethoxy, 2-hydroxyethoxy, chloro, fluoro or acetyl;

Y₂ is 9H-xanthone optionally substituted with up to seven R₁ groups wherein R₁ is independently H, OH, methyl, ethyl, propyl, nitro, methoxy, ethoxy, 2-hydroxyethoxy, chloro, fluoro or acetyl;

Y₃ is phenyl optionally substituted with up to 5 R₁ groups wherein R₁ is independently H, OH, methyl, ethyl, propyl, nitro, methoxy, ethoxy, 2-hydroxyethoxy, chloro, fluoro or acetyl; and

Z is independently -R₆COOH, -R₆SO₃H or -N-trifluoromesylsulfonamidate wherein R₆ is independently a bond or propyl.

A pharmaceutical composition according to claim 11, wherein the non-peptidyl compound is selected from the following group of compounds:

(xv) 4,4'-Methylenebis[3-hydroxy-2-naphthalenecarboxylic acid];

(xvi) 7-[3-(4-acetyl-2-ethyl-5-hydroxyphenoxy)propoxy]-3,4-dihydro-8-propyl-2H-1-benzopyran-2-carboxylic acid;

(xvii) 2,4-dichloro-6-(N-(trifluoromethanesulfonyl))sulfamoylphenyl 3,5-dichloro-2-hydroxybenzenesulfonate;

(xviii) 7-[(4-acetyl-3-hydroxy-2-propylphenyl)methoxy]-4-oxo-8-propyl-4H-1-benzopyran-2-carboxylic acid;

- (xix) 7-[3-(4-acetyl-3-methoxy-2-propylphenoxy)propoxy]-3,4-dihydro-8-propyl-2*H*-1-benzopyran-2-carboxylic acid;
- (xx) 3,4-dihydro-8-propyl-7-[[3-[2-ethyl-5-hydroxy-4-(1*H*-pyrazol-3-yl)phenoxy]propyl]oxy]-2*H*-1-benzopyran-2-carboxylic acid;
- 5 (xxi) 3,4-dihydro-8-propyl-7-[[3-[2-ethyl-5-hydroxy-4-ethoxyphenoxy]propyl]oxy]-2*H*-1-benzopyran-2-carboxylic acid;
- (xxii) 3-[4-[7-carboxy-9-oxo-3-[3-[2-ethyl-4-(4-fluorophenyl)-5-hydroxyphenoxy]propoxy]-9*H*-xanthene]]propanoic acid;
- (xxiii) 8-propyl-7-(quinol-2'-ylmethoxy)-3,4-dihydro-2*H*-1-benzopyran-2-carboxylic acid;
- 10 (xxiv) 7-(naphth-2'-ylmethoxy)-8-propyl-3,4-dihydro-2*H*-1-benzopyran-2-carboxylic acid;
- (xxv) *N*-(trifluoromethanesulfonyl)-3,5-dinitro-4-(*N,N'*-dipropylamino)benzenesulfonamide;
- 15 (xxvi) 8-propyl-7-[3-[4-(4-fluorophenyl)-2-ethyl-5-hydroxyphenoxy]propoxy]-3,4-dihydro-2*H*-1-benzopyran-2-carboxylic acid;
- (xxvii) 3,4-dihydro-7-[[6-(4-methoxyphenyl)hexenyl]oxy]-8-propyl-2*H*-1-benzopyran-2-carboxylic acid; or
- 20 (xxviii) 8,8'-[Carbonylbis[imino-3,1-phenylenecarbonylimino(4-methyl-3,1-phenylene)carbonylimino]]bis-1,3,5-naphthalenetrisulfonic acid.

- 5

[illegible]

AD
C4

addition